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Notice of Allowability

Application No.

10/615,051

Examiner

Brook Kebede

Applicant(s)

VAARTSTRA, BRIAN A.

Art Unit

2823

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 07 January 2005.
2. ☒ The allowed claim(s) is/are 1-40.
3. ☒ The drawings filed on 7/7/03 are accepted by the Examiner.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).
 - * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO-1449 or PTO/SB/08),
Paper No./Mail Date 7/7/03, 12/5/03 & 11/17/04
4. ☐ Examiner's Comment Regarding Requirement for Deposit
of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413),
Paper No./Mail Date _____.
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverses of Species I, i.e., Claims 1-40, in the reply filed on January 7, 2005 is acknowledged. Accordingly, claims 41-58 cancelled by applicant.

Allowable Subject Matter

2. Claims 1-40 are allowed over prior art of record.

Reasons for Allowance

3. The following is an examiner's statement of reasons for allowance:

The prior art of record neither anticipates nor renders obvious the claimed subject matter of the instant application as a whole either taken alone or in combination, in particular, prior art of record does not teach "introducing first and second vapor phase reactants in alternate and temporally separated pulses to the substrate within the chamber in a plurality of deposition cycles under conditions effective to deposit a phosphorus doped silicon dioxide comprising layer on the substrate, one of the first and second vapor phase reactants being $\text{PO}(\text{OR})_3$ where R is hydrocarbyl, and an other of the first and second vapor phase reactants being $\text{Si}(\text{OR})_3\text{OH}$ where R is hydrocarbyl," as recited in claim 1 and "chemisorbing a first species to a surface of the substrate to form a first species monolayer onto the surface within the chamber from a first vapor phase reactant comprising $\text{PO}(\text{OR})_3$, where R is hydrocarbyl; contacting the chemisorbed first species with a second vapor phase reactant comprising $\text{Si}(\text{OR})_3\text{OH}$, where R is hydrocarbyl, to form a monolayer comprising Si and O; and successively repeating chemisorbing with the first species and contacting the chemisorbed first species with the second reactant under conditions

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effective to deposit a phosphorus doped silicon dioxide comprising layer on the substrate,” as recited in claim 23 respectively.

Re claims 1 and 23, George et al. (US 2002/0018849) disclose CVD deposition of SiO_2 layer using a precursor compound having $\text{Si}(\text{O})_a(\text{OR})_{4-a}$ or $\text{SiH}_b(\text{OR})_{4-b}$, wherein R is an alkyl group a and b are numbers 0-4. However, George et al. do not disclose the vapor phase reactants $\text{PO}(\text{OR})_3$ and $\text{Si}(\text{OR})_3\text{OH}$ as well as the alternate and temporally separated pulses to the substrate within the chamber in a plurality of deposition cycles under conditions effective to deposit a phosphorus doped silicon dioxide comprising layer, as recited in claim 1, and chemisorbing with the first species and contacting the chemisorbed first species with the second reactant under conditions effective to deposit a phosphorus doped silicon dioxide comprising layer on the substrate, as recited in claim 23.

Hill et al. (US 2004/0509484) disclose forming of phosphorous doped silicon dioxide layer using $\text{P}(\text{OC}_2\text{H}_5)_3$ and TEOS by ALD process or chemisorbing a first species to a surface of the substrate to form a first species monolayer onto the surface within the chamber from a first vapor phase reactant. However, Hill et al. do not disclose the first precursor and the second precursor compounds as recited in claims 1 and 23.

~~Therefore, prior-art do not teach the aforementioned claimed limitations of the instant application as a whole either taken alone or in combination.~~

Claims 2-22 and 24-40 are also allowed as being directly or indirectly dependent of the allowed independent base claim

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Conclusion

4. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."


Correspondence

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brook Kebede whose telephone number is (571) 272-1862. The examiner can normally be reached on 8-5 Monday to Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on (571) 272-1855. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

BK
March 17, 2005


George Fourson
Primary Examiner